Population dynamics modelling of a multicellular strain of Saccharomyces Cerevisiae

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Résumé

The factors contributing to the evolutionary stabilization of multicellular life forms in the history of life are still debated within the scientific community, and require experimental as well as theoretical investigation. To this end, Bertrand Daignan-Fornier and his team of biologists (IBGC) are designing evolutionary competition experiments between unicellular and multicellular forms of the yeast *Saccharomyces cerevisiae.* More particularly, the nutrient environment is considered here as an important factor potentially driving such competition. However, the connection between the population dynamics of these strains over time and the shared nutrient environment needs clarification, especially for multicellular strains, who display a complex physical structure.

Our goal is thus to develop mathematical models of the yeast population dynamics. This approach will, on one hand, shed light how an entity grows in response to its environment, and on the other hand, enable the numerical reproduction of the evolutionary competition experiments conducted at the IBGC.

In this poster, I will present a mathematical model describing the evolution of a population of multicellular yeasts, along with experimental data obtained in our collaboration with IBGC biologists. A particular attention will be given to the numerical resolution of the model, which should retain several integral quantities measured experimentally.

Mots-Clés: Saccharomyces cerevisiae, growth, fragmentation equation, mathematical modeling, finite volume schemes

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